1. Collins MD, Keller SL (2008) *PNAS,* 105(1):124-128.
2. Devaux PF , Morris R (2004) *Traffic,* 5:241-246.
3. Jönsson P, Beech JP, Tegenfeldt JO, Höök F (2009) *JACS*, 131(14):5294-5297.

**494-Pos Board B249**
**Influence of Cis and Trans Unsaturated Lipids on an Interdigitated Membrane**
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We have examined the effects of adding *cis*- and *trans*-unsaturated lipid to a fully interdigitated membrane using differential scanning calorimetry (DSC) and x-ray diffraction. For the interdigitated lipid, we used a monofluorinated analog of 1,2-dipalmitoyl-*sn*-glycero-3-phosphocholine (DPPC). The single fluorine atom on the end of the *sn*-2 chain allows 1-palmitoyl-2-(16-fluoropalmitoyl)*sn*-glycero-3-phosphocholine (F-DPPC) to spontaneously form the interdigitated gel phase ($L_{\beta}$I) below the main transition temperature ($T_m$). Both the *cis* 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC) and the equivalent *trans* lipid 1,2-dielaidoyl-*sn*-glycero-3-phosphocholine (DEPC) are strongly disfavored to form the $L_{\beta}$I phase. There is a large degree of phase segregation between interdigitated and non-interdigitated lipid in DOPC/F-DPPC and DEPC/F-DPPC. The DSC thermograms reveal low miscibility and that both unsaturated lipids broaden and lower the main transition corresponding to the F-DPPC-rich component. Our WAXS data demonstrate that the unsaturated lipids progressively disrupt the intermolecular packing at higher concentrations. Furthermore, the SAXS data show that as the ratio of unsaturated lipid increases, the amount of interdigitated lipid decreases. The interdigitated gel phase formed by F-DPPC is resilient in the sense that the interdigitated phase disappears only at very high fractions of the unsaturated lipid. However, at the same concentration of unsaturated lipid, a greater percentage of the membrane remains interdigitated with DEPC than with DOPC. Therefore, the *cis* isomer is more disruptive and inhibits interdigitation more effectively than the *trans* isomer. This behavior supports the general conclusion that lipids with *trans* fatty acids have properties that are intermediate between saturated and *cis*-unsaturated lipid.

**495-Pos Board B250**
**The Permeability Coefficient of Bilayer Lipid Membrane for Cationic Porphyrins**
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The interaction of porphyrins with membranes is an important part in understanding the mechanism of action of porphyrins on the biological object. Porphyrins exhibit biological effect as a result of direct interaction with biological membranes, or interaction with intracellular structures, as a result of its passing through the membrane. That's why it is very important to study the interaction of different porphyrins with membranes and to check if this interaction had any effect on the physicochemical properties of membranes. Because of the complicated organization and functioning of cellular membranes, it is appropriate to conduct experiments on model object, such is bilayer lipid membrane (BLM). The effect of meso-tetra-[4-N-(2′-oxyethyl) pyridyl] and Zn-meso-tetra-[4-N-(2′- oxyethyl) pyridyl] porphyrins on the permeability of BLM is studied using optical (UV/Vis absorption) method. The special cell adapted to UV/VIS spectrophotometer is made for the investigation of porphyrin penetration through BLM. The passage of porphyrins through the membrane is investigated by absorption in the Soret band as a function of time. As a result the permeability coefficient of BLM is calculated for these porphyrins by the method of least-squares [1].
Obtained results allow to understand the mechanisms of porphyrins passage through the cell membranes. This approach is aimed at understanding and optimizing the chemical structure and pharmacological properties of porphyrins usable in medicine. These investigations are also important in terms of interaction of porphyrins with liposomes [2], as liposomes, the structural basis of which are bilayer membranes, are widely used as transportation to deliver drugs (for example, based on porphyrins) to the target-cell.
[1] A. Torosyan, V. Arakelyan, R. Ghazaryan. The 5th EMBO meeting, Amsterdam, Abstract book, p. 230 (2013).
[2] F. Postigo, M. Mora, M. De Madariaga et al. International Journal of Pharmaceutics, 278(2): 239-54 (2004).

**496-Pos Board B251**
**Comparing Phase Transition Temperatures of Giant Plasmid Membrane Vesicles with Different Preparation Methods**
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Giant plasma membrane vesicles (GPMVs) are traditionally made by incubating cells with a buffer containing a reducing agent and a low concentration of formaldehyde. When GPMVs are prepared in this way from RBL-2H3 cells, the vesicles appear uniform around physiological temperatures, but phase separate into coexisting liquid-ordered and liquid-disordered phases at lower temperatures. When the reducing agent dithiothreitol (DTT) is used, the GPMVs typically phase separate in the range 15°C - 20°C, where transition temperature is defined as the temperature where half of the vesicles produced by a cell population contain coexisting liquid phases. Significantly lower transition temperatures (typically ~0C) are found when DTT is replaced with either glutathione or N-ethylmaleimide (NEM), as has been observed previously for the case of NEM (Levental et al. 2010). GPMVs were also prepared using a method that does not utilize either a reducing agent or formaldehyde, but instead uses a hypertonic chloride salt solution that results in the secretion of vesicles similar in size to those of the reducing agent methods (Del Piccolo et al. 2012). GPMVs made in this way have very low transition temperatures, typically <0C. In addition to lower transition temperatures, GPMVs prepared using NEM, glutathione, or through osmotic stress all contain a slightly increased surface fraction of liquid-ordered phase at low temperatures. These results are consistent with the previous conclusion that DTT induces biochemical changes in inner leaflet proteins that result in elevated transition temperatures and a reduced protein partitioning with liquid-ordered phase lipids (Levental et al. 2010).

**497-Pos Board B252**
**Raft Boundary Structure is Responsible for Monolayer Domains Coupling and Line Activity of Non-Bilayer Components**
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In present work the structure of raft/surrounding membrane boundary is calculated basing on hydrophobic mismatch model. Raft boundary energy is minimal when boundaries of monolayer domains forming a bilayer raft are shifted by a finite distance about 4 nm. The algorithm is developed to estimate the system energy as a function of relative shift of monolayer domains centers. It is shown that for decoupling of 30 nm radius raft it is necessary to overcome the energy barrier of about 20 kBT; for reassembly of the bilayer raft it is necessary to overcome the energy barrier of about 15 kBT height. From analysis of bending stress profile across the boundary it follows that non-bilayer components possessing large spontaneous curvature tend to accumulate in narrow regions near the raft boundary. The accumulation of even small amounts of the components leads to significant change of domain line tension. This allows to explain the line activity of such components, observed experimentally.

**498-Pos Board B253**
**Probing Cholesterol-Lipid Interactions and Chemical Activity of Cholesterol in Bilayers via Cyclodextrin Depletion**
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Mammalian cells regulate the concentration of cholesterol in their plasma and endoplasmic reticulum membranes (1). That regulation may be triggered by changes in the chemical activity of cholesterol in those membranes. Determining the activity of cholesterol, even in a model system, is a difficult task. In 2000, Radhakrishnan and McConnell investigated lipid monolayers at an air-water interface and presented evidence that lipids and cholesterol form complexes with a particular stoichiometry (2). By using cyclodextrin to remove cholesterol from the monolayer, they found that the chemical activity of cholesterol changed dramatically at the stoichiometry of the complex. Inspired by their work and the work of others (3), we use cyclodextrin to remove cholesterol from supported lipid bilayers that we image by fluorescence microscopy. We measure the rate at which the area of three types of bilayers decreases. The bilayers are composed of a binary mixture of cholesterol and one of three different phospholipids for which the area condensation of lipid and cholesterol in bilayers is known (4). Combining these data, we determine the rate of